

C 4.2: Ser

150 YEARS OF SERVICE 1807-1957



SESQUICENTENNIAL CELEBRATION
COAST AND GEODETIC SURVEY

U. S. DEPARTMENT OF COMMERCE

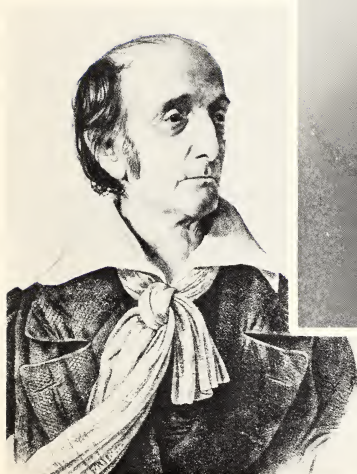
WASHINGTON, D. C.



EARLY OFFICES OF THE SURVEY

Home office for nearly a century was on a site now occupied by the New House Office Building on Capitol Hill. The bureau moved, first to a rented building, then to the Department of Commerce Building, in the 1930's.

FERDINAND R. HASSLER



FIRST DIRECTOR, 1807-1843



REAR ADM. H. ARNOLD KARO, DIRECTOR

DIRECTOR'S MESSAGE

Our Sesquicentennial year focuses attention on the efficient and dedicated service of a host of loyal public servants from almost the very beginning of the Nation. I am happy to pay tribute to the accomplishments of our predecessors which are reflected in the century and a half of progress being celebrated during 1957. Future progress is contingent upon intelligent and discriminating recruitment of personnel to insure adequate leaders in the decades ahead. This message is especially directed to those inclined to seek a rewarding career in carrying on the vital services performed by the Coast and Geodetic Survey.

A BRIEF HISTORY OF THE U. S. COAST AND GEODETIC SURVEY

In this year of 1957, the Coast and Geodetic Survey celebrates a century and a half of service to the Nation. Born February 10, 1807, it was the first technical bureau of the Federal Government. It came about through necessity. Congress, recognizing the need for coastal charts for commerce, empowered President Jefferson to have a survey made of the coast. The American Philosophical Society, after examination of several plans for the work, recommended Ferdinand Rudolph Hassler, a Swiss geodesist, to head the task. Accordingly Hassler was chosen—he of the far-sighted principles and high standards of precision which have guided the Survey throughout its years.

Hassler's Successor, Alexander Dallas Bache, great-grandson of Benjamin Franklin and one of America's all-time great scientists, expanded and organized the work, and developed new ideas to meet the needs of the rapidly-growing nation. Geodetic surveys, the basis of mapping and engineering work, grew far and wide. Coastal charts were made, tides and currents were recorded, magnetic observations were started, and the Gulf Stream was explored. Even before the gold rush, survey parties went to the new west, where George Davidson labored and became the father of science in California. Bache led the Survey through the strenuous years of the Civil War, lending its technical services and the efforts of its engineers to the conduct of many field campaigns.

Following Bache, there came a succession of heads, some of them leading scientists—others strong administrators. Under the guidance of these men and their assistants, the Survey continued on its mission. The beginning of surveys in Alaska in 1867, accelerated by the later discovery of gold, presaged a long and still unfinished story of charting in that austere land, in which all later Survey officers have had a part. Many of the peaks, bays, headlands, and glaciers now bear the names of Dall, Mendenhall, Faris, and others, and hundreds of places immortalize the visits of the famous steam-launch COSMOS and other Survey vessels.

The Philippines, the other great overseas undertaking of the Survey, now have modern charts of the

7,000 islands as a result of more than 40 years of work in that tropical wonderland where working conditions were so good, and the problems of the work so varied, that it was considered a necessary training ground for a whole generation of Survey engineers.

E. Lester Jones, the first great Director of the modern period, devoted the varied capacities of the Survey to participation in the First World War; he established the commissioned officer system for the organization of the bureau; and he initiated a far-reaching development and adoption of modern techniques and methods.

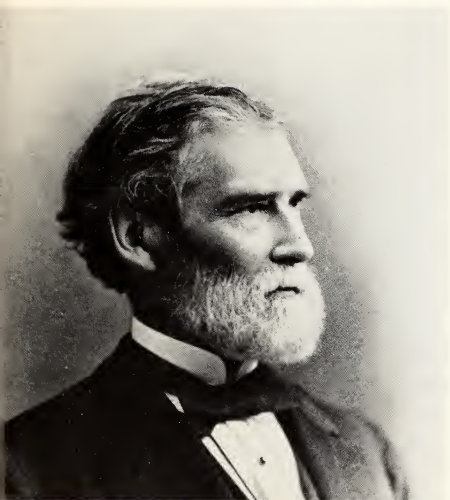
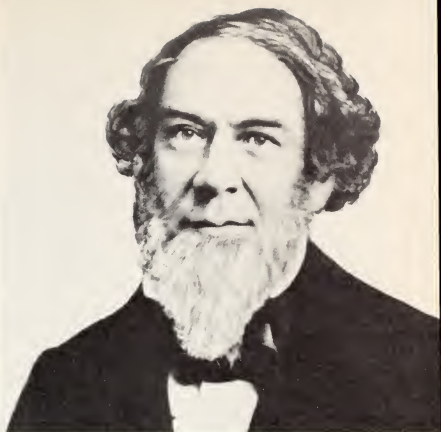
From the beginning, the Survey has had to lead the world in the development of equipment and methods. In the last century, its engineers invented sounding machines and current meters, and undertook triangulation schemes across thousands of miles of frontier territory. In this century, it has pioneered in the wire drag which sweeps the sea for hidden rocks and shoals, in echo sounding, which has revolutionized hydrographic surveying, in radio acoustic position-finding which permitted work in darkness and fog, and more lately in numerous devices for the position-control of hydrographic work by use of radio signals.

Charles Schott, John Hayford, and William Bowie developed new methods and enunciated new principles of geodesy. They effected the permanent adjustment of all geodetic data for North America, and they established the principle of isostasy, which has shaped subsequent geophysical thought. Louis Bauer and John Fleming established magnetic observatories and developed a program of investigation into the vagaries of magnetism. Rolin Harris developed the theory of the tides and constructed a tide predicting machine which is still in use after 45 years.

In World War II, the Survey participated in countless ways and its officers distinguished themselves by their many accomplishments. Today, once more devoting itself to peacetime pursuits directed toward the economic welfare of the country, the Survey continues its efforts to be of service to the nation, under the same principles and standards given us by Hassler 150 years ago.

**ALEXANDER DALLAS BACHE,
SUPERINTENDENT 1843-1867**

Great scientist, organizer, and leader—he built firmly on the foundations laid down by Ferdinand Hassler, first head of the Bureau.



GEORGE DAVIDSON, ASSISTANT 1845-1895

Tireless worker and brilliant mind—he was leader of scientific thought in the new West. A geographic pioneer, he authored a voluminous description of the Pacific Coast which stands as one of the best *Coast Pilots* of all time.

E. LESTER JONES, DIRECTOR 1915-1928

Farsighted administrator—he raised the sight of the Survey and fitted it for the demands of the new scientific age.

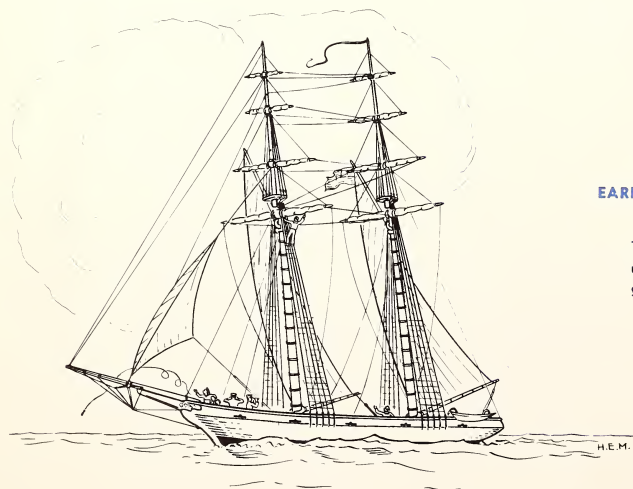




SHIPBOARD OPERATIONS

Charting our waters is a never-ending job, as men and nature make new channels and alter shorelines. On ships such as this, the Survey sounds the waters and makes other hydrographic and

oceanographic investigations. The resulting nautical charts provide guidance for water commerce and protect the Navy from striking ground.



EARLY SURVEY SHIP EXPERIMENT

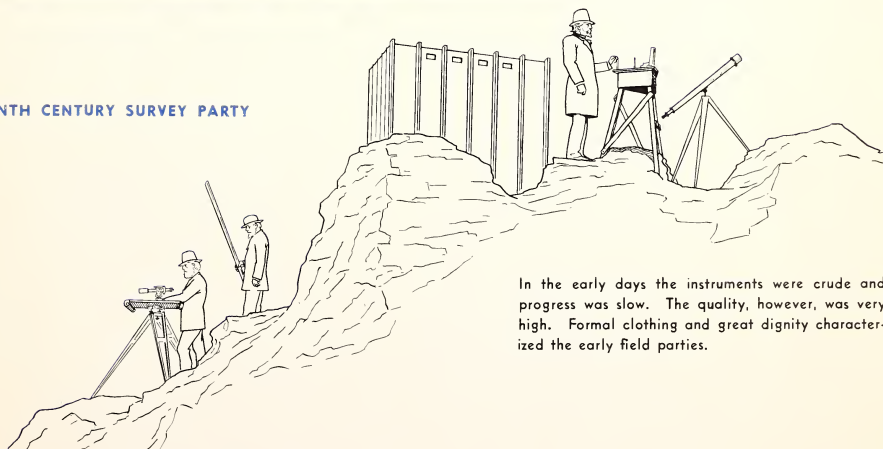
This sailing vessel, one of the first ships used by the Survey, performed hydrographic work in New York Bay in 1835.

A PIONEERING SERVICE

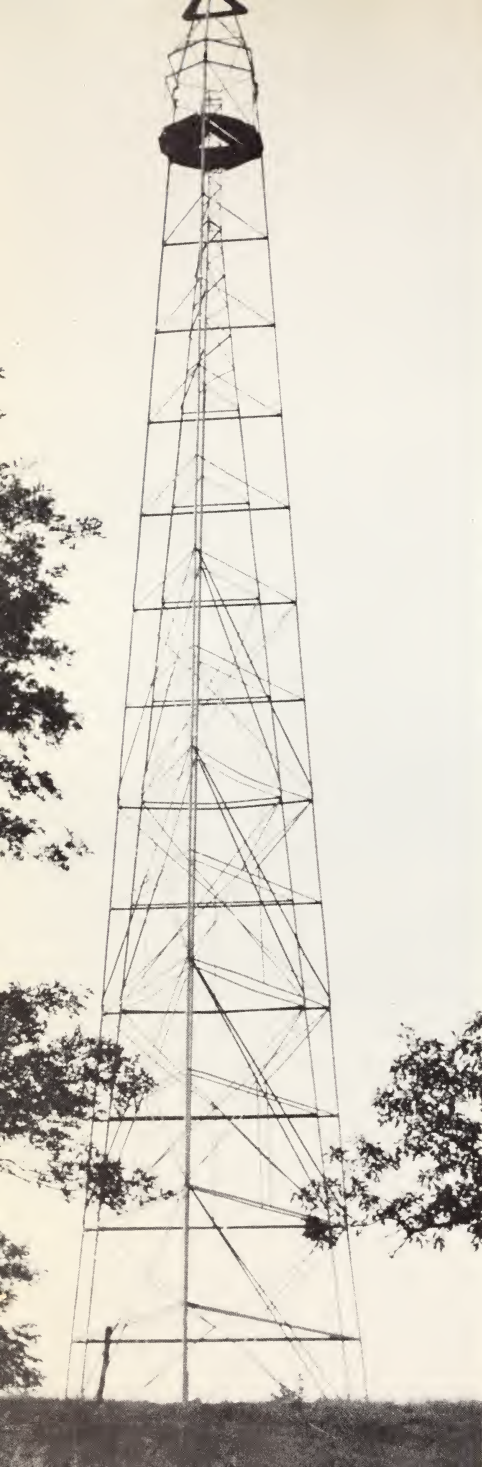
The work takes the Survey's engineers into the remote corners of the land. A basic framework of surveys from end to end of the country—even to the limits of Alaska—is necessary for the coordination of all the work.



NINETEENTH CENTURY SURVEY PARTY



In the early days the instruments were crude and progress was slow. The quality, however, was very high. Formal clothing and great dignity characterized the early field parties.

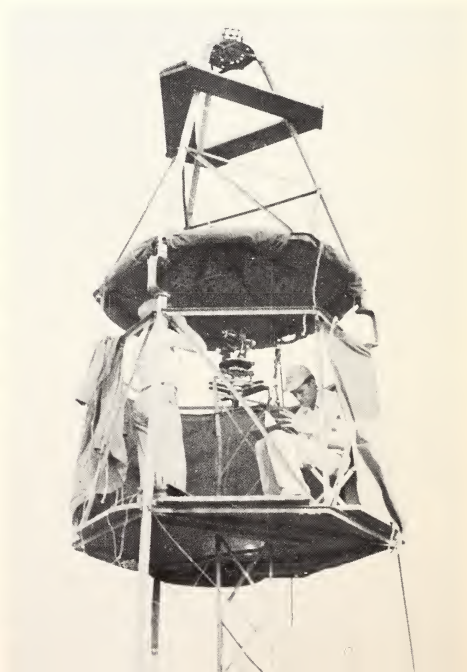


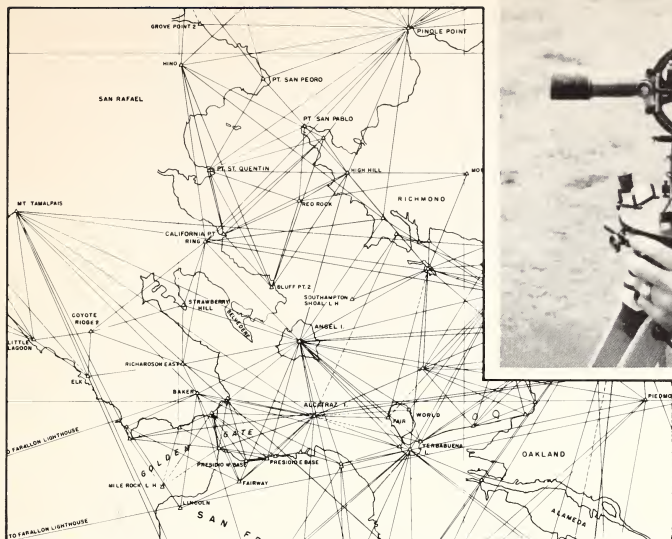
CONTROL SURVEYS

Geodetic surveys of the bureau comprise a basic framework for the coordination of all the work, as well as for general mapping and all kinds of engineering activities. Within this framework are fitted the National topographic maps and aeronautical charts, land and property surveys, and surveys for construction undertakings such as highways, irrigation, and flood control.

TRIANGULATION

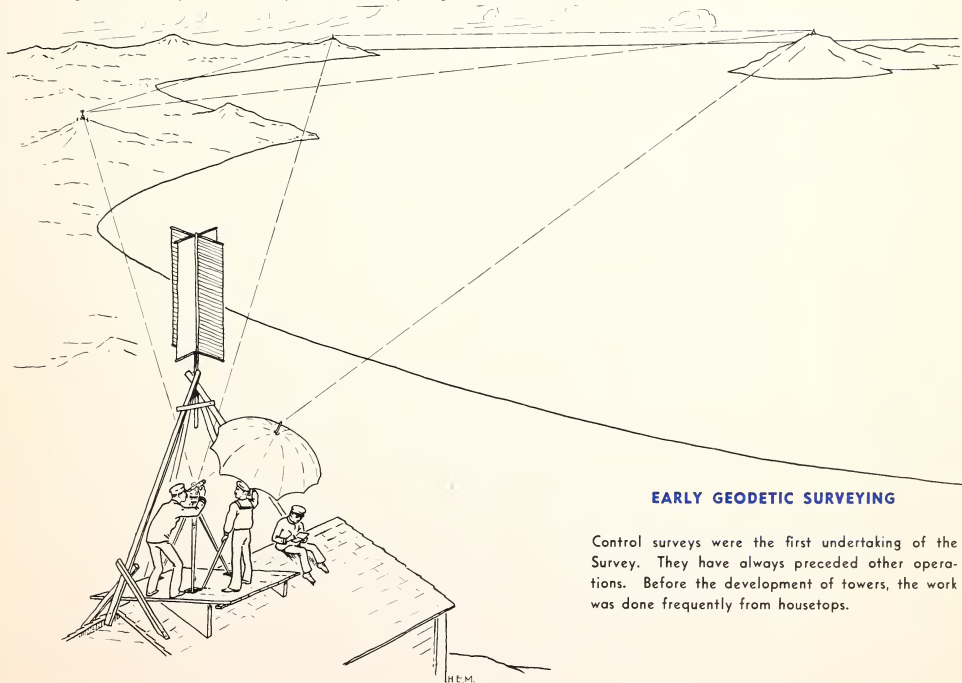
This is a method of long-distance measurement by observing the value of the angles between lines joining a network of stations, then computing the lengths of the triangle sides. Precise theodolites, or angle-measuring instruments, often have to be elevated on temporary towers for this purpose.





Every Coast Survey engineer must become a skilled user of the theodolite.

Chains of triangles have been extended throughout the country. Latitudes and longitudes of all points are computed accurately for general use.

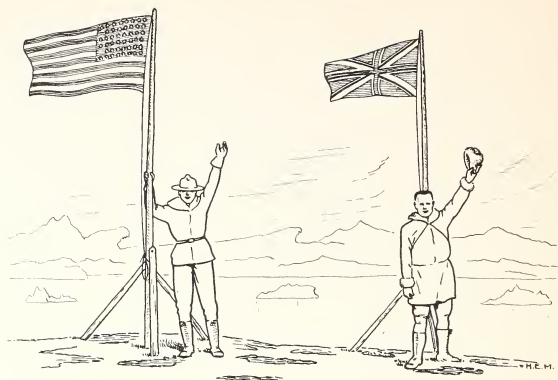


EARLY GEODETIC SURVEYING

Control surveys were the first undertaking of the Survey. They have always preceded other operations. Before the development of towers, the work was done frequently from housetops.

ARCTIC OPERATIONS

Hydrographic and topographic surveys based on an extension of the National triangulation system are performed along the Arctic coast of Alaska.



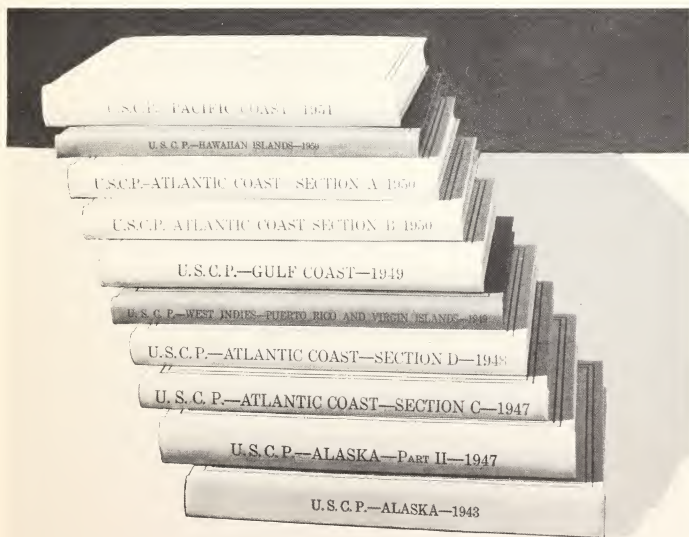
ALASKA HAS REQUIRED MUCH SURVEY WORK



The Survey began operations soon after the acquisition of our vast northern outpost. One of the early great undertakings was the demarcation of the boundary with Canada—all the way from Dixon Entrance to the Arctic Ocean.

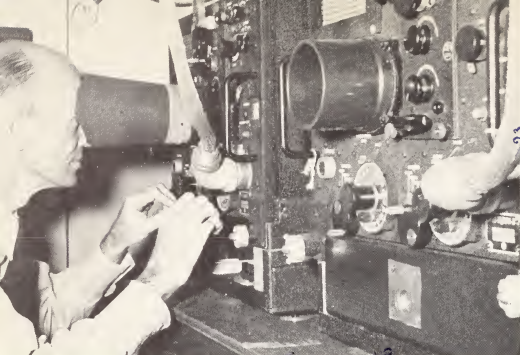
MODERN SURVEY VESSEL PATHFINDER

One of the major vessels of the Survey fleet. She is equipped with all modern devices for her work. With her sisters and cooperating shore units, 85,000 miles of shoreline and over 2 million square miles of waters in the United States, Alaska, and the Hawaiian and Virgin Islands are kept safely charted.



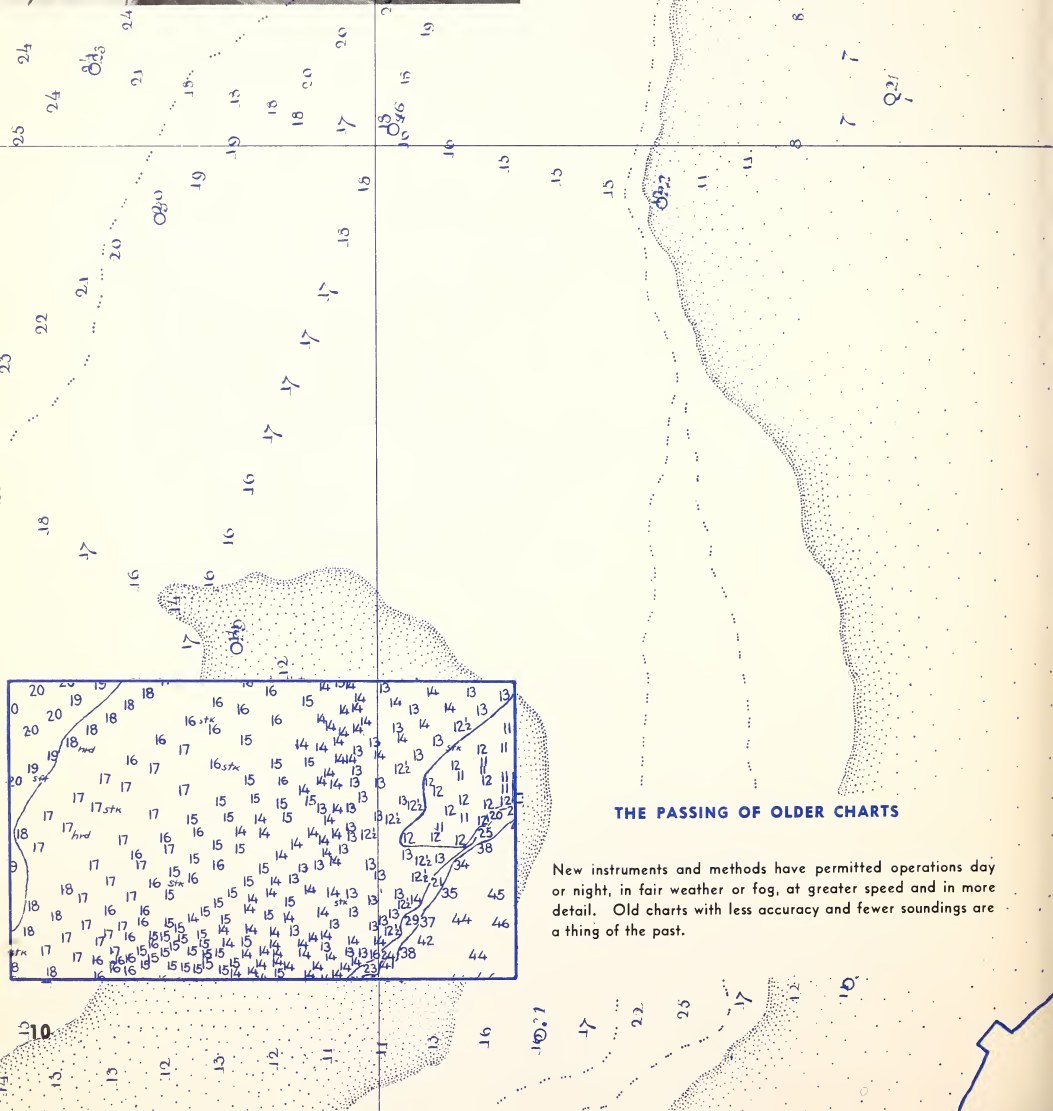
COAST PILOTS

Much essential information cannot easily be shown on charts. Descriptions of landmarks and port facilities, operating regulations, recommended courses and other nautical advice—all are provided in these guidebooks. They treat our entire coast and are kept up to date by frequent field checks.



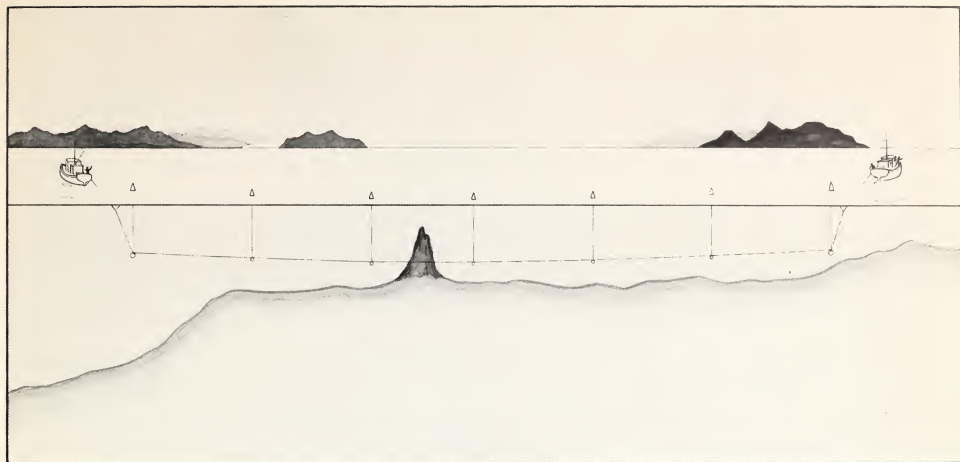
ELECTRONICS IN HYDROGRAPHIC SURVEYING

While the leadline and sextant still have a place in hydrographic surveying, they have largely been replaced by modern methods. Continuous echo-sounding profiles of the ocean floor are drawn by fathometers. Electronic position-finding equipment helps locate the soundings on the chart.



THE PASSING OF OLDER CHARTS

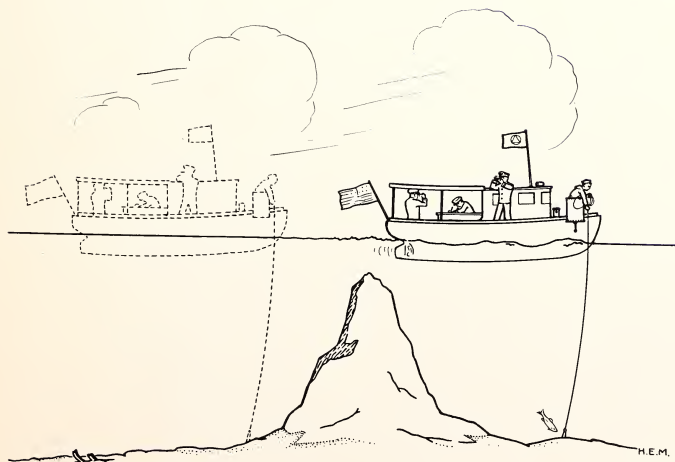
New instruments and methods have permitted operations day or night, in fair weather or fog, at greater speed and in more detail. Old charts with less accuracy and fewer soundings are a thing of the past.



WIRE DRAG

Even modern methods may fail to find all submerged pinnacles. To remove all doubt, the Survey uses the wire drag to sweep rocky waters as in northern New England, Long Island Sound,

the Florida Keys, and Alaska. Many a shipwreck on such hidden dangers has thereby been avoided.

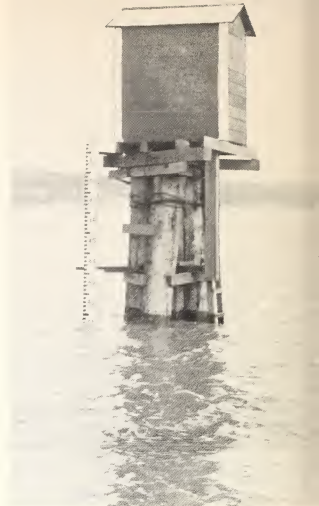
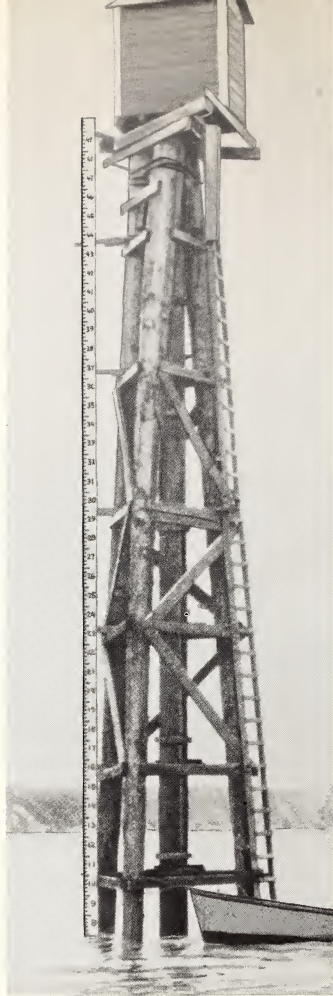


EARLY SOUNDING

Historic methods preceding electronic and sonic apparatus were simple and reasonably accurate, but the spacing between soundings involved danger of missing sharp pinnacle rocks.

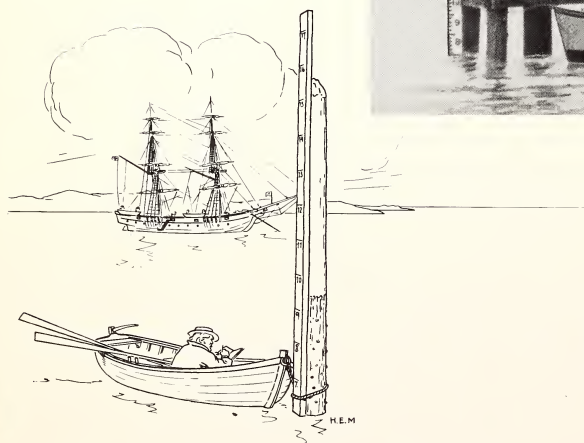
TIDAL INVESTIGATIONS

At many points along the coast the rise and fall of the tide is recorded by automatic gages. The resulting data are used in the adjustment of hydrographic surveys and provide the necessary information for the setting of a machine which can predict future tides years in advance, taking account of as many as 37 astronomic factors.



EARLY TIDE OBSERVER

The rise and fall of the water was observed more than 100 years ago at a limited number of places by crude but effective methods.

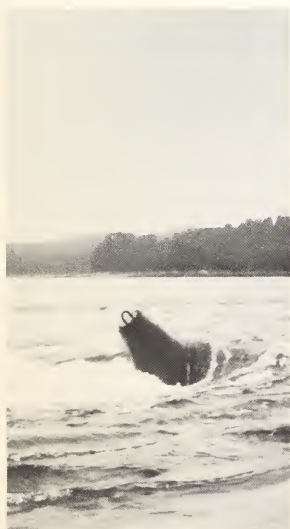


CURRENT INVESTIGATIONS

The tidal currents in the coastal waters must be observed, their routines established, and predictions made for the future, in order to assist pilots and navigators in controlling the movements of their ships.

BUOY IN A CURRENT

Swift currents are often caused by tides or storms.





**SURVEY SHIPS LEAVING SEATTLE
FOR WORKING GROUNDS IN ALASKA**



LEVELS

Height differences are carried forward by such a party as this. Elevations above sea level have been so determined for hundreds

of thousands of points everywhere. As in many other cases, the precise instruments were developed in the Survey.




ELEVATION MARKER

TRIANGULATION MARKER

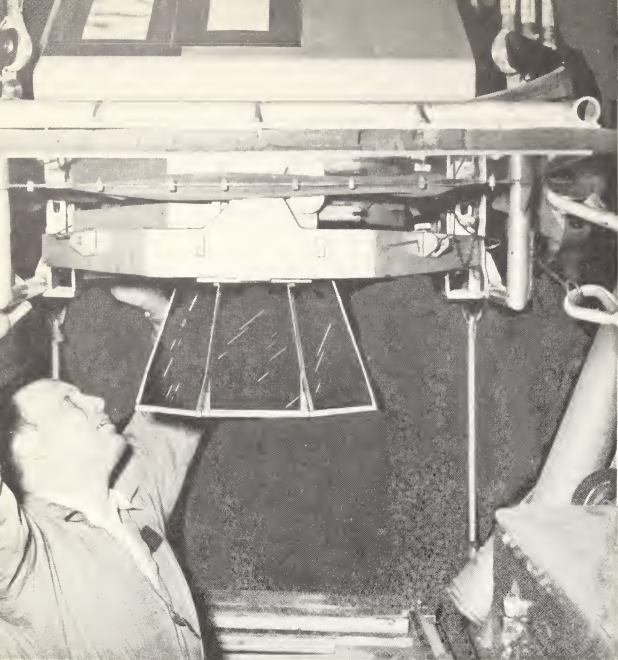
Results of the Survey fieldwork are permanently preserved and made publicly available by the setting of permanently marked survey monuments. Metal plates convey the necessary information.



A high-angle, black and white aerial photograph of a city, likely New York City, showing a dense grid of buildings and streets. The perspective is from directly above, looking down on the city. The buildings are mostly rectangular and arranged in a regular pattern, with some larger, more complex structures interspersed. The streets are narrow and run in straight lines, creating a grid-like pattern. The overall image has a grainy, historical quality.

PHOTOGRAMMETRY

No other method of surveying can match the wealth of information, fullness of detail, speed, and efficiency provided by the aerial camera. The Survey maps large land areas along the coast needed on the nautical charts.



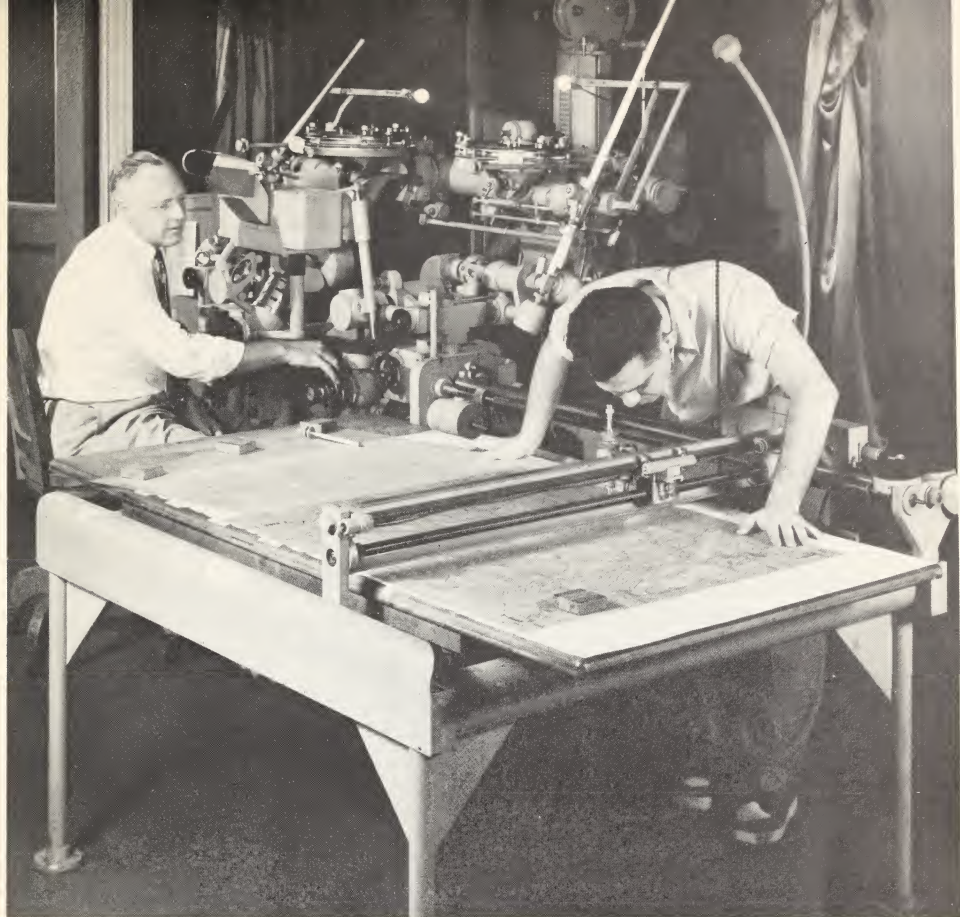
NINE-LENS CAMERA

A Survey photographer at 14,000 feet with this Survey-developed mapping camera can record all the details of 125 square miles of the earth in the flick of a shutter.

PLANETABLE

Formerly the standard instrument for mapping the shore detail needed on nautical charts, the plane table is now reserved for occasional small jobs.





PLOTTING INSTRUMENT

The stereoplanograph is one of several types of instruments designed to make maps from the air photographs. By stereoscopic inspection of pairs of such pictures, the relief of the land and the heights of objects can be drawn upon the chart.

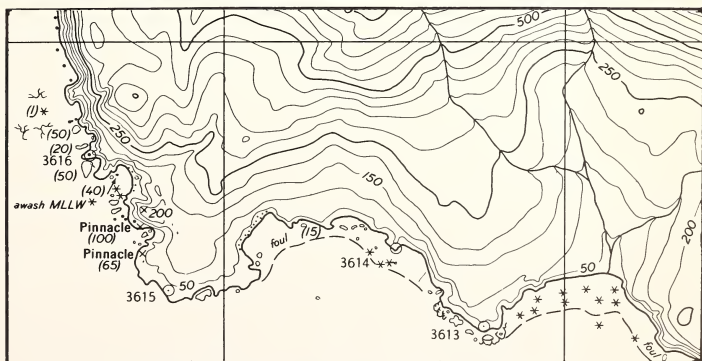
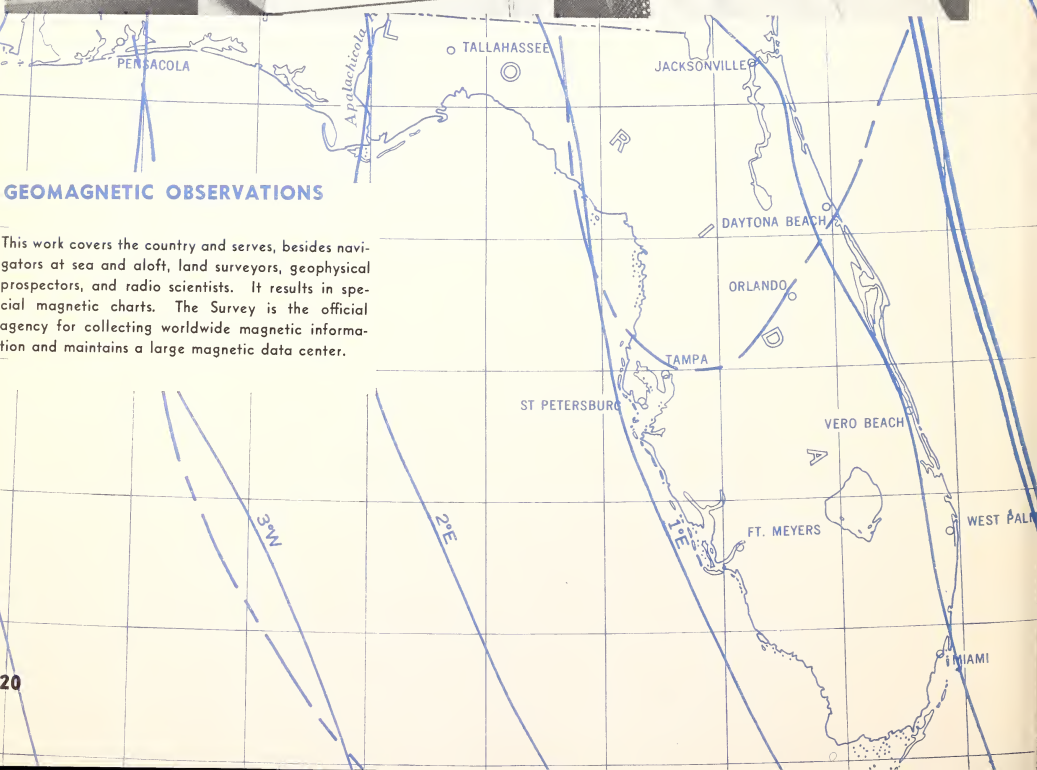


Chart detail from air photographs is precise and complete.

CHARTS CONTAIN MUCH IMPORTANT INFORMATION

GEOPHYSICS

The Survey has long performed geophysical work for the provision of collateral information. Geomagnetic investigations provide compass-use information in navigation and many other types of information. Seismological studies help protect life and property from the destructive effects of earthquakes.



GEOMAGNETIC OBSERVATIONS

This work covers the country and serves, besides navigators at sea and aloft, land surveyors, geophysical prospectors, and radio scientists. It results in special magnetic charts. The Survey is the official agency for collecting worldwide magnetic information and maintains a large magnetic data center.

MAGNETIC OBSERVATORIES



ADMINISTRATION BUILDING,
FREDERICKSBURG OBSERVATORY



FREDERICKSBURG, YA.



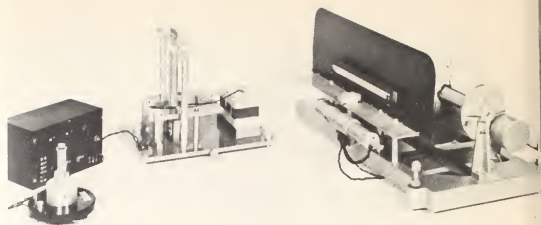
TUCSON, ARIZONA

SAN JUAN, PUERTO RICO



EARTHQUAKE INVESTIGATIONS

Because of its special skills and facilities, the Survey was assigned this work more than 30 years ago. Main objects are to gain scientific knowledge of these devastating events of nature, to map their areas of greatest occurrence, and to provide data to help engineers in designing safe structures. Seismic sea waves, which arise from submarine earthquakes, are detected and warnings broadcast.



SEISMOGRAPH

DESTRUCTIVE EFFECTS OF EARTHQUAKE



SEISMOLOGY

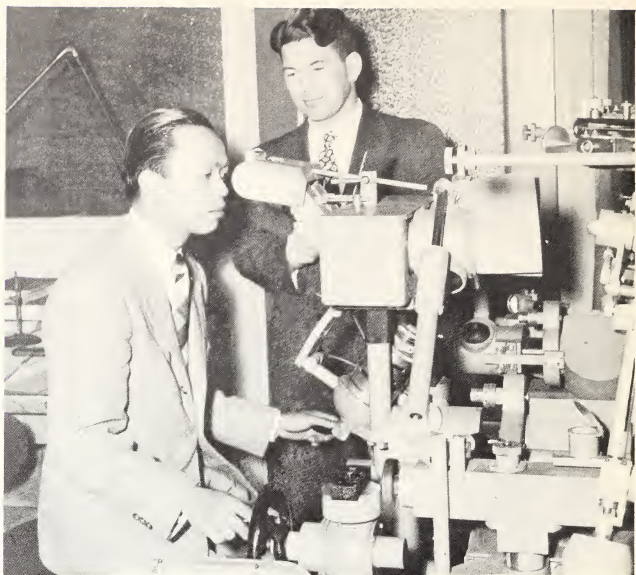
This instrument waits patiently on its assigned station for an earthquake to rock the ground locally, when it will measure and

record the character and violence of the motion. Engineers require this knowledge.



INTERNATIONAL TRAINING ACTIVITY

The Survey has cooperated since World War II with our National foreign-aid activities by training foreign students in the various phases of cartography and related subjects. About 300 students from many countries have received such training. Technical missions have been sent by the bureau to other countries to assist in the development of mapping and geophysics programs. Other aspects of international cooperation activities have included continuous consulting services rendered the Inter-American Geodetic Survey.



FOREIGN TRAINEES AT WORK

INTER-AMERICAN GEODETIC SURVEY IN COLOMBIA



CHART ENGRAVING



Field records after processing are used by cartographic draftsmen who construct the familiar Coast and Geodetic Survey nautical charts showing the channels, shoals, fishing banks, and other navigational information. Aeronautical charts are also compiled and published.

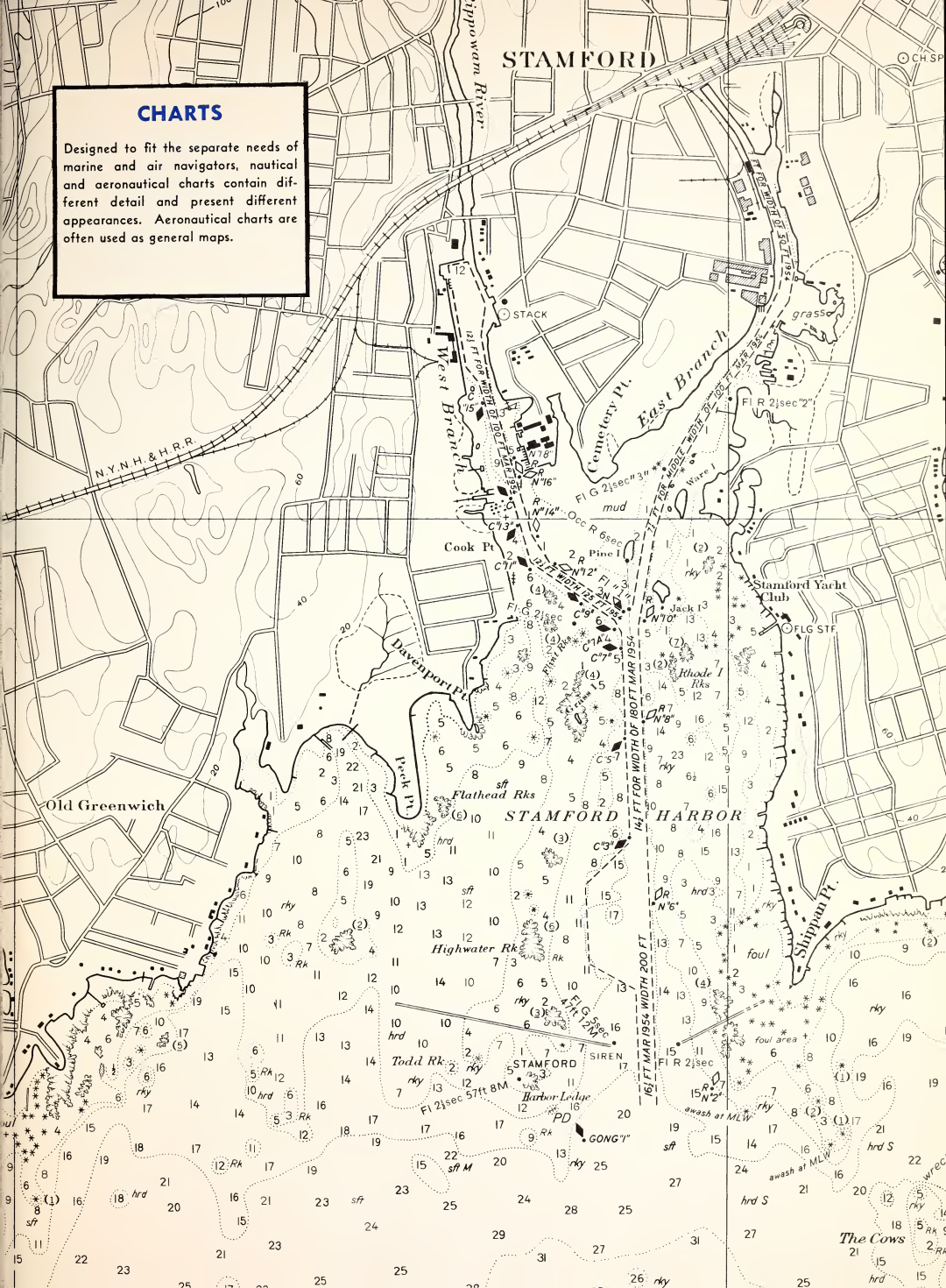
WHAT GOES INTO A SINGLE CHART

Even one nautical chart requires much source material, all of which must be carefully checked. Most of this material is from original Survey records; other data are included when available. The demand for reliable charts for navigating at sea or in the air has grown year by year with the growth of commerce, and the Survey has always kept pace with this demand.



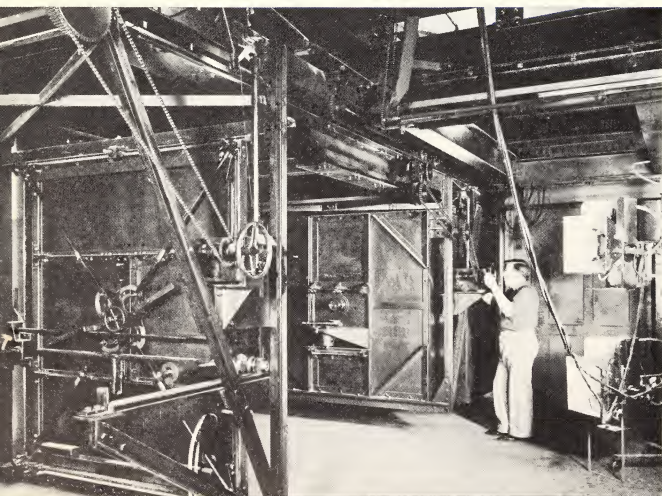
CHARTS

Designed to fit the separate needs of marine and air navigators, nautical and aeronautical charts contain different detail and present different appearances. Aeronautical charts are often used as general maps.





SECTION OF AIR-CONDITIONED PRESSROOM



Large multicolor presses print the charts. Some have as many as nine different colors. More than 45,000,000 nautical and aeronautical charts are issued by the Survey each year.

PRECISION PROCESS CAMERA



DEPARTMENT OF COMMERCE BUILDING

Since 1931 the Coast and Geodetic Survey offices have been in this building. They occupy the basement and first three floors of the wing facing Constitution Avenue, opposite the Washington Monument.

PENN STATE UNIVERSITY LIBRARIES



A000070901771